

## *Design Memorandum No. 01-02*

TO: Engineering Offices and Divisions  
Districts  
Consulting Engineers

FROM: Kenneth Birst, Design Engineer

DATE: November 14, 2001

SUBJECT: Wetland and Tree Review Guidance

Design Manual Reference:

Section II-03

\_\_\_\_\_ Revision

\_\_\_\_\_° Supplemental

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### **Introduction**

Two different degrees of wetland reviews have been implemented in the milestone process: “Type 1 Wetland and Tree Review” (T1WTR) and “Type 2 Wetland and Tree Review” (T2WTR). T1WTR’s are intended to expedite the project development process for projects with small amounts of earthwork and will be used on projects with low potential to impact wetlands and trees. T2WTR’s will be conducted similarly to the previous manner of conducting wetland reviews.

### **Implementation**

T1WTR’s will be used on projects with small amounts of earthwork (pipe and box culvert extensions or replacement, approach slope flattening, etc.), where the total potential for wetland impacts due to earthwork is usually one acre or less. The entire disturbed area beyond the existing toe of slope will be mitigated as an impacted wetland or impacted tree loss area. T1WTR’s will usually be done by the project concept report (PCR) author or their designee.

T2WTR’s are to be used on projects where the total potential for wetland impacts is typically greater than one acre. T2WTR’s will be coordinated through the Design Division, Engineering and Environmental Section.

The initial type of wetland review will be assigned through the milestone review process. However, the required type of review may change if the amount of assumed earthwork changes the total potential wetland impacts from less than one acre to greater than one acre or vice versa.

## Guidance

The following table is an overview of the required tasks and corresponding responsible party required to complete the wetland review:

Step No.	Milestone Tasks for Wetland Review Activity	Responsible Party	
		Type 1 Wetland and Tree Review	Type 2 Wetland and Tree Review
1	Base Maps Supplied	PCR Author or designee	PCR Author or designee
2	Wetland Field Review	NA	Staff Biologist / Consultant
3	Tree Field Review	PCR Author or designee	Staff Biologist / Consultant
4	Wetland and Tree Delineation Transmittal	NA	Staff Biologist / Consultant
5	Wetland and Tree Impact Calculation & Transmittal	PCR Author or designee	PCR Author or designee
6	Wetland and Tree Statement	PCR Author or designee	Staff Biologist
7	Mitigation Tracking	Engineering and Environmental Section	Engineering and Environmental Section

### Step 1 - Base Maps Supplied

T1WTR's only need a sketch or illustration (preferably old grading plan and profiles) accurate enough to perform the calculations in Step 5 (Wetland Impact Calculation & Transmittal).

T2WTR's usually require full project delineation. The PCR author should discuss the types of needed base maps with the staff biologist. Usually grading plans or aerial photos are required. PCR authors, located in the central office, may be asked to obtain the USGS topographical and National Wetland Inventory (NWI) maps.

Both T1WTR's and T2WTR's should include a legal description of the project location (e.g. section, township, and range). This description will be used for the 404 permit, if required.

The PCR author or designee is responsible for supplying the base map information.

### Step 2 - Wetland Field Review

T1WTR's do not require field verification because earthwork beyond the toe of slope will be mitigated as wetland impacts. However, pictures of all temporarily impacted areas are required (e.g. on-site box culvert detours and staging areas).

T2WTR requirements and methods are discussed in the 1987 Corps of Engineers "Wetland Delineation Manual" and the NDDOT Guidance for Wetland Delineations. Maintenance type earthwork (e.g. ditch cleanout to restore original ditch gradeline) may not involve wetlands. Therefore, this type of earthwork will be verified and excluded from wetland impacts.

### Step 3 - Tree Field Review

Both T1WTR and T2WTR's should inspect the project for potential tree impacts. The Tree Field Review for T1WTR is to be conducted by the PCR author or designee. The Tree Field Review for T2WTR is to be conducted by the staff biologist/consultant.

Count the number and measure the size of trees that will be impacted. The diameter of the tree will be measured at a height of 24 inches above the ground. Deciduous trees (shedding foliage at the end of the growing season) that are both shorter than 15' and have a diameter less than 3" do not need to be counted. Evergreen trees that are shorter than 5' do not need to be counted. Include impacts related to needed construction staging and detour routes. If it is not feasible to count and measure every tree impact, contact the Engineering and Environmental Section to determine a method of identifying project tree impacts.

### Step 4 - Wetland and Tree Delineation Transmittal

This step is not applicable to T1WTR. For T2WTR's, this step will simply be the official filing of the wetland delineation in central file and delivery of the delineation to the PCR author.

### Step 5 - Wetland and Tree Impact Calculation & Transmittal

For T1WTR, all earthwork disturbances beyond the toe of slope are assumed wetland impacts. Wetland impacts are usually measured in terms of area (acres, to nearest 0.01), from the existing toe of slope to the proposed toe of slope. This calculated wetland impact will be used for mitigation and documentation purposes. Example calculations are attached. If the assumed wetland impacts are greater than one acre, contact the Engineering and Environmental Section for further guidance.

T2WTR calculations use the delineation provided by the staff biologist/consultant. The wetland impacts are usually measured in terms of area (acres, to nearest 0.01), from the existing toe of slope to the proposed toe of slope.

Both T1WTR's and T2WTR's should have impacts itemized for each wetland location (e.g. list multiple box culverts impacts separately).

Detailed calculations for both T1WTR and T2WTR should be submitted to the Engineering and Environmental Section.

#### Step 6 - Wetland and Tree Statement

Wetland and Tree Statements for T1WTR are written by the PCR author. Note the PCR author may have to contact the staff biologist to discuss the mitigation method and site. The Wetland and Tree Statement must be included in both the draft and final PCR, under the "Impacts" section. Wetland and tree statements for T2WTR shall be coordinated with the staff biologist.

Wetland statements should contain the following information:

- A. Note if wetland calculations are based on assumed total potential wetland impacts or from wetland delineation conducted by the staff biologist/consultant.
- B. Summarize the amount of assumed or actual permanent wetland and tree impacts for all alternatives.
- C. Summarize the amount of temporary wetland impacts to be restored at the existing location (e.g. on-site box culvert detours and staging areas).
- D. State the method and site or location of mitigation (e.g. on- or off-site).

#### Step 7 - Mitigation Tracking

The Engineering and Environmental Section will use the impacts noted in the PCR wetland and tree statement to track mitigation. If the wetland impacts are revised during the final design and a 404 Permit is required, the impacts in the 404 Permit will be used to track mitigation. If the scope of the project or wetland impacts changes from what is noted in the PCR, the designer is responsible for notifying the Engineering and Environmental Section.

#### Questions

Any questions regarding the content or implementation of this memorandum should be referred to Mark S. Gaydos, Design Division, 701-328-4417.

#### Approved

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Francis G. Ziegler -Infrastructure Support Services Director

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Date

## Approach Slope Flattening Wetland Impact Tables

Area of Impacted Wetland (acres, based on information below)												
Roadway Clearzone Distance From Centerline (ft)		32										
Approach Pipe within 60' of mainline Centerline		no										
Ditch Depth (ft)		4										
Approach Inslope (run to rise, x to 1)	Distance from Mainline Centerline to Toe of Hwy Inslope											
	28	29	30	31	32	33	34	35	36	37	38	
1	0.012	0.011	0.010	0.010	0.009	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
2	0.009	0.008	0.008	0.007	0.007	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
3	0.006	0.006	0.006	0.005	0.005	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
4	0.004	0.004	0.004	0.003	0.003	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
5	0.003	0.002	0.002	0.002	0.002	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
6	0.001	0.001	0.001	0.001	0.001	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
7	0.001	0.000	0.000	0.000	0.000	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	

Area of Impacted Wetland (acres, based on information below)												
Roadway Clearzone Distance From Centerline (ft)	34											
Approach Pipe within 60' of mainline Centerline	no											
Ditch Depth (ft)	4											
Approach Inslope (run to rise, x to 1)	Distance from Mainline Centerline to Toe of Hwy Inslope											
	28	29	30	31	32	33	34	35	36	37	38	
1	0.013	0.012	0.012	0.011	0.010	0.010	0.009	N.A.	N.A.	N.A.	N.A.	
2	0.010	0.009	0.009	0.008	0.008	0.007	0.007	N.A.	N.A.	N.A.	N.A.	
3	0.007	0.007	0.006	0.006	0.006	0.005	0.005	N.A.	N.A.	N.A.	N.A.	
4	0.005	0.005	0.004	0.004	0.004	0.003	0.003	N.A.	N.A.	N.A.	N.A.	
5	0.003	0.003	0.003	0.002	0.002	0.002	0.002	N.A.	N.A.	N.A.	N.A.	
6	0.002	0.002	0.001	0.001	0.001	0.001	0.001	N.A.	N.A.	N.A.	N.A.	
7	0.001	0.001	0.001	0.000	0.000	0.000	0.000	N.A.	N.A.	N.A.	N.A.	

Area of Impacted Wetland (acres, based on information below)											
Roadway Clearzone Distance From Centerline (ft)		36									
Approach Pipe within 60' of mainline Centerline		no									
Ditch Depth (ft)		4									
Approach Inslope (run to rise, x to 1)	Distance from Mainline Centerline to Toe of Hwy Inslope										
	28	29	30	31	32	33	34	35	36	37	38
1	0.014	0.013	0.013	0.012	0.012	0.011	0.010	0.010	0.009	N.A.	N.A.
2	0.011	0.010	0.010	0.009	0.009	0.008	0.008	0.007	0.007	N.A.	N.A.
3	0.008	0.008	0.007	0.007	0.006	0.006	0.006	0.005	0.005	N.A.	N.A.
4	0.006	0.006	0.005	0.005	0.004	0.004	0.004	0.003	0.003	N.A.	N.A.
5	0.004	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.002	N.A.	N.A.
6	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	N.A.	N.A.
7	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	N.A.	N.A.

Area of Impacted Wetland (acres, based on information below)												
Roadway Clearzone Distance From Centerline (ft)			38									
Approach Pipe within 60' of mainline Centerline			no									
Ditch Depth (ft)			4									
Approach Inslope (run to rise, x to 1)	Distance from Mainline Centerline to Toe of Hwy Inslope											
	28	29	30	31	32	33	34	35	36	37	38	
1	0.015	0.015	0.014	0.013	0.013	0.012	0.012	0.011	0.010	0.010	0.009	
2	0.012	0.012	0.011	0.010	0.010	0.009	0.009	0.008	0.008	0.007	0.007	
3	0.009	0.009	0.008	0.008	0.007	0.007	0.006	0.006	0.006	0.005	0.005	
4	0.007	0.006	0.006	0.006	0.005	0.005	0.004	0.004	0.004	0.003	0.003	
5	0.004	0.004	0.004	0.004	0.003	0.003	0.003	0.002	0.002	0.002	0.002	
6	0.003	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	
7	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	

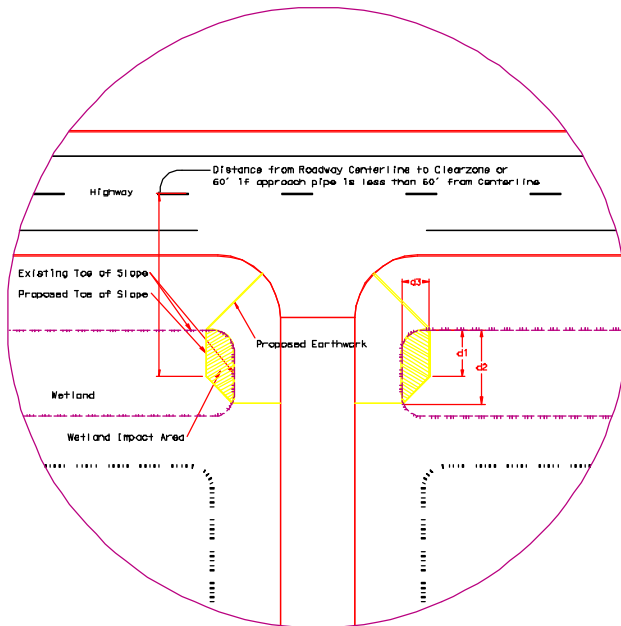
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Area of Impacted Wetland (acres, based on information below)											
Roadway Clearzone Distance From Centerline (ft)	48										
Approach Pipe within 60' of mainline Centerline	no										
Ditch Depth (ft)	4										
Approach Inslope	Distance from Mainline Centerline to Toe of Hwy Inslope										
(run to rise, x to 1)	28	29	30	31	32	33	34	35	36	37	38
1	0.022	0.021	0.021	0.020	0.019	0.019	0.018	0.017	0.017	0.016	0.015
2	0.018	0.017	0.017	0.016	0.015	0.015	0.014	0.014	0.013	0.013	0.012
3	0.014	0.013	0.013	0.012	0.012	0.011	0.011	0.011	0.010	0.010	0.009
4	0.010	0.010	0.010	0.009	0.009	0.008	0.008	0.008	0.007	0.007	0.007
5	0.007	0.007	0.007	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.004
6	0.004	0.004	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003
7	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001

Area of Impacted Wetland (acres, based on information below)											
Roadway Clearzone Distance From Centerline (ft)		50									
Approach Pipe within 60' of mainline Centerline		no									
Ditch Depth (ft)		4									
Approach Inslope (run to rise, x to 1)	Distance from Mainline Centerline to Toe of Hwy Inslope										
	28	29	30	31	32	33	34	35	36	37	38
1	0.023	0.022	0.022	0.021	0.021	0.020	0.019	0.019	0.018	0.017	0.017
2	0.019	0.018	0.018	0.017	0.017	0.016	0.015	0.015	0.014	0.014	0.013
3	0.015	0.014	0.014	0.013	0.013	0.012	0.012	0.011	0.011	0.011	0.010
4	0.011	0.011	0.010	0.010	0.010	0.009	0.009	0.008	0.008	0.008	0.007
5	0.008	0.007	0.007	0.007	0.007	0.006	0.006	0.006	0.006	0.005	0.005
6	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.003	0.003	0.003	0.003
7	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001

[illegible]

Area of Impacted Wetland (acres, based on information below)											
Roadway Clearzone Distance From Centerline (ft)	NA										
Approach Pipe within 60' of mainline Centerline	yes										
Ditch Depth (ft)	4										
Approach Inslope	Distance from Mainline Centerline to Toe of Hwy Inslope										
(run to rise, x to 1)	28	29	30	31	32	33	34	35	36	37	38
1	0.030	0.029	0.028	0.028	0.027	0.026	0.026	0.025	0.024	0.024	0.023
2	0.024	0.024	0.023	0.023	0.022	0.021	0.021	0.020	0.020	0.019	0.019
3	0.019	0.019	0.018	0.018	0.017	0.017	0.017	0.016	0.016	0.015	0.015
4	0.015	0.014	0.014	0.014	0.013	0.013	0.012	0.012	0.012	0.011	0.011
5	0.010	0.010	0.010	0.010	0.009	0.009	0.009	0.009	0.008	0.008	0.008
6	0.007	0.006	0.006	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.005
7	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002



## Approach Slope Flattening

For projects with safety work, one calculation describing the wetland area impacted from a typical approach safety improvement can be used for all approaches.

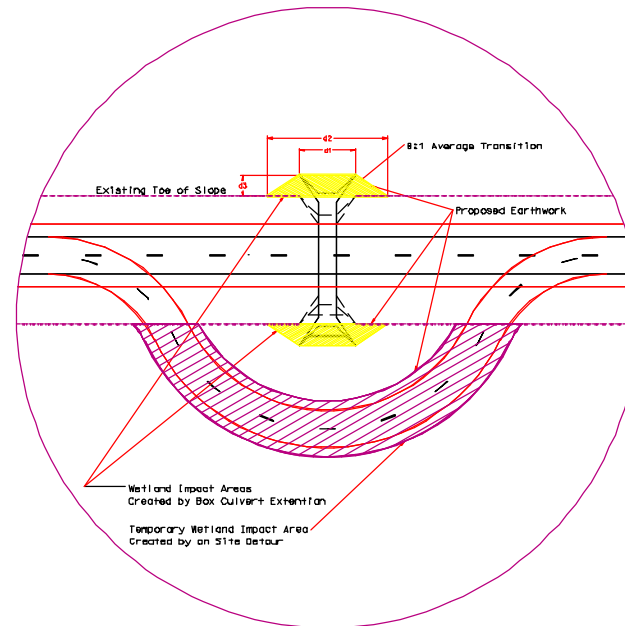
Approach Slope Flattening Example Calculations:

$$\begin{aligned} d1 &= 10' \\ d2 &= 25' \\ d3 &= 18' \\ \text{Area} &= (d1+d2)/2 \times d3 \\ &= (10+25)/2 \times 18 \\ &= 285 \text{ SF} = 0.007 \text{ acres} \end{aligned}$$

$$\begin{aligned} \text{Wetland Impact Area} &= 0.007 \text{ acres} \times \text{two sides} \times 23 \text{ approaches} \\ &= 0.32 \text{ acres} \end{aligned}$$

See "Approach Slope Flattening Wetland Impact Tables" for various calculated areas. An explanation of how the above variables are used in the tables is given below.

$$\begin{aligned} d1 &= (\text{distance from centerline to clearzone or } 60' \text{ if approach pipe within } 60' \\ &\text{ of roadway centerline}) - \text{distance from centerline to toe of slope} \\ d2 &= d1 - d3 \\ d3 &= \text{ditch depth} \times (8 - \text{approach slope}) \\ \text{Approach slope given in terms of run value (e.g., 4:1 slope, run value} &= 4) \end{aligned}$$



## Box Culvert Extension

Drawing Not to Scale

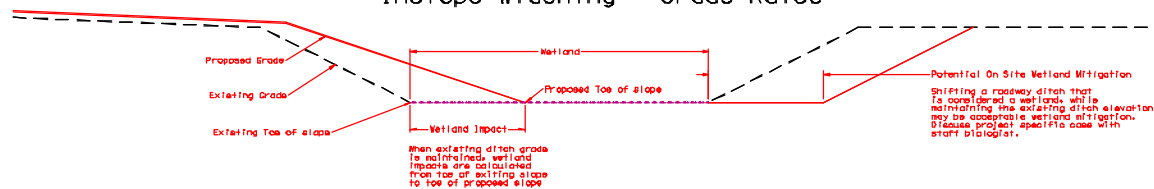
Box Culvert Example Calculations:

$$\begin{aligned} d1 &= 36' \\ d2 &= 35'2 \times d3 \times 41 = 148' \\ d3 &= (d1+d2)/2 \times d3 \\ &= (36+148)/2 \times 7 \\ &= 644 \text{ SF} = 0.018 \text{ acres} \end{aligned}$$

$$\begin{aligned} \text{Wetland Impact Area} &= 0.018 \text{ acres} \times \text{two sides} \\ &= 0.03 \text{ acres} \end{aligned}$$

$$\begin{aligned} \text{Temporary Wetland Impact Area (Detour):} \\ \text{Area} &= \text{length of detour out side of existing roadway toe of slope} \times \text{width of detour} \\ &= 1500' \times 40' = 60000 \text{ SF} = 1.38 \text{ acres} \end{aligned}$$

## Inslope Widening - Grade Raise



Wetland Calculation Guidance